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AUTHOR Ikai, Akira
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ABSTRACT

This report contains a summary of computer uses among education centers, research institutes, and schools in Japan, based on investigations carried out within 47 prefectures and 10 designated cities throughout the nation. Information presented in the narrative report and eight data tables includes: (1) use of computers in local education centers and research institutes as of 1982, with specific computer models, memory storage capacity, and particular utilization; (2) number of schools and teachers taking advantage of the data processing services at Aichi prefectural education center, with data processing contents and grade level of the school; (3) contents of inservice training for teachers and other education-related personnel held at Aichi prefectural education center, with level and number of courses, course contents, and number of participants; (4) distribution of microcomputers among schools as of January 1983, with grade level and public/private school designation; (5) uses of microcomputers in schools in Japan, with grade level and public/private school designation; (6) situations regarding microcomputers and requests for their introduction among schools in Aichi prefecture as of December 1982, with grade level and number of schools furnished with microcomputers; (7) uses of microcomputers in schools in Aichi prefecture as of December 1982, with grade level and types of utilization; (8) number of data processing programs developed by schools in Aichi prefecture as of December 1982, and average number of programs developed per school having microcomputers. (JB)

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USE OF COMPUTER IN EDUCATION IN JAPAN

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USE OF COMPUTER IN EDUCATION IN JAPAN

Section for Educational Cooperation in Asia
NATIONAL INSTITUTE FOR EDUCATIONAL RESEARCH OF JAPAN
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N O T E

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Introduction

The diffusion of computers in Japan is remarkable; the daily life of the nation is directly and indirectly connected with the use of computers. Indeed, it could be said that in these days, the nation cannot function without computers. However, their introduction into the field of education has fallen behind in a substantial manner, and is presently in a "predawn" state. The following is an outline of computer uses among the education centres, research institutes and schools in Japan.

I. COMPUTER USES AMONG LOCAL EDUCATION CENTRES AND RESEARCH INSTITUTES

Local education centres and research institutes offer various services such as studies on special and technical matters related to education, in-service training for teachers and other education-related personnel, educational broadcasting, developments of teaching materials, provision of libraries and film centres.

In recent years, the introduction of computers into these services has become important in the effort to provide appropriate information to schools and teachers in an efficient manner. In order to facilitate the establishment of the management system of educational information, investigations have been carried out on the establishment of computers, the actual condition, problems and solutions of their uses at the education centres and research institutes of the 47 prefectures and 10 designated cities throughout the nation. The findings of these investigations are described below.

1. The Situation in Regard to Computer Establishment and Use

The situation regarding computer establishment and use in local education centres and research institues is shown in Table 1.

Table 1 Use of Computers in Local Education Centres and Research Institutes (1982)

Pref. & Des. City	Model	Memory storage capacity	a	b	c	d	e	f
Aichi	ACOS-550	8M		x	x	x	x	
Hokkaido	ACOS-550	6M	x	x		x		
Fukushima	FACOM-M160F	6M	x			x		
Fukuoka	HITAC-M180-III	6M	x	x	x	x	x	x
Ōita	ACOS-450	6M	x	x	x	x	x	
Kumamoto	FACOM-M160F	5M	x			x		
Hiroshima	ACOS-350	4M	x		x	x		
Saga	MELCOM-700III	4M	x	x		x		
Miyagi	FACOM-M150F	3M	x			x		
Shiga	FACOM-M160S	2.5M	x	x		x		
Ōsaka	FACOM-M150F	2M		x		x	x	x
Sapporo	ACOS-250	1.5M		x	x	x		x
Iwate	NEAC 2200	48K	x	x		x	x	
Gunma	FACOM 230-28	64K	x	x		x	x	x
Toyama	FACOM 230-25	128K	x	x	x		x	x
Ishikawa	FACOM 230-28	48K	x	x			x	x
Fukui	FACOM 230-25	48K	x			x	x	
Tottori	FACOM 230-25	48K	x			x		x
Tokushima	FACOM 230-25	32K	x			x	x	

Notes: a - Used for the students' practical training

b - Used for services for instruction and office work at schools

c - Reference of books, documents and printed materials

d - Used for in-service computer training of teachers and other education-related personnel

e - Used for data processing for educational administration

f - Used for office work management at the centres or research institutes

In 1982, only 19 institutions out of 57 throughout the country were furnished with computers (33.3%). Moreover, the actual situation was that in 16 of the 19 institutions where computers were put into use they were shared with students for practical training.

Three institutions installed computers for educational research.
Use of computer for educational research is far behind.

Details about practical training for students will be given later in another section; thus only a brief summary is necessary here. In this practical computer training students learn data processing in order to pursue such courses as commerce (information processing) and industry (information technology) in vocational upper secondary schools. Although most of the prefectures establish cooperative training centres exclusively for this activity (several upper secondary schools jointly make use of them), the above-mentioned 16 institutions, in addition to using the computers for the students' practical training, also use these computers for educational information management and provision, and for in-service training of teachers.

2. Problems Arising from Establishment of the Management System of Educational Information

Methods of educational information collection, management and provision within the local education centres and research institutes are diverse, regardless of whether or not computers are used. However, every one of these institutions is making efforts to arrange highly effective systems. The following are the issues where problems and their solutions are discussed:

(1) Issues needing to be solved, whether or not computers are used:

1) Some kind of standard for selection should be established, in order to raise the quality of the educational information that is collected and managed.

2) Since classification categories where educational information is to be pigeonholed differ with each education centre and research institute, there is no interchangeability of educational information files. Therefore, it is inefficient in terms of making use of the educational information stored by other institutions.

3) The solutions should be dealt with on a nation-wide level (rather than by each individual institution) in order to solve these problems and to realize a circulation of educational information between each institution.

(2) Problems arising from the arrangement of educational information management systems, where computers are put into use:

1) What kind of system would be most appropriate for a unified nation-wide system?

2) What kind of data base should be constructed which would make mutual utilization of educational information possible?

3) What kind of matters should be settled between institutions in order to gradually expand the system so that the educational information needed can be obtained easily?

4) In an effort to deal with the above-mentioned issues, communication, coordination, mutual understanding and research should be carried out along the following lines:

a. Systematic and efficient collection and arrangement of primary information.

b. Organizations supplying primary information both promptly and accurately.

c. Preparation of standards for selection, classification codes and thesaurus for the documentary retrieval system.

d. Preparation of data base.

e. Collaboration with other institutions.

f. Computerization of library works.

3. Facts about Computer Uses

The following description of Aichi Prefectural Education Center is given as one example of computer use in local education centres and research institutes.

(1) Documentary retrieval service

1) Collection, processing and storage of primary information

Bulletins and study reports published by schools in the prefecture, national and local education centres and research institutes and education-related institutions such as universities are collected, processed and placed in designated stacks in libraries.

2) Registration and storage into the file of the documentary retrieval system

The following documentary data and keywords are registered, based on the educational research papers recorded in the collected primary information. (Educational research papers number about 5,000 papers per year and as of March 1983 the primary information papers stored totalled approximately 40,000.)

a. Types of documentary data

Document classification number, codes of every kind (classification, object of research, etc.), location (place within the library where primary information is stored), bibliography (names of the recorded primary information), volume, issue number, page, publication date, name of author, name of institution or school, title, subtitle.

b. Keywords

Keywords representing the research contents are selected (within 9 words) and registered, based on the thesaurus.

c. Retrieval methods

Reference is done by terminals designed for reference and placed inside the library (? units).

(a) First-step reference

Reference by keywords: searching for the papers which fall under the research contents to be examined.

(b) Second-step reference

Reference by documentary data classified by school category, subject area, and region: narrowing down the papers to be searched for, on the basis of the results from the first-step reference.

d. Utilization methods

The users come to the centre and search by themselves. Staff of the centre undertake the task of guidance for computer manipulation. In the case where the user cannot come in person, he/she may request by telephone that the staff carry out the search. Reference results are sent back to the user.

e. Use

July and August is the time of year when schools close for summer vacation, and when numerous in-service training programmes for teachers and other education-related personnel are held at this centre. Therefore the use of computers is most frequent during this period.

Approximately six people take advantage of the system every day, and about 25 educational research papers are searched for and used.

f. Effects of computer use

Educational research papers needed by schools or teachers can be searched for in both a rapid and appropriate manner. As a result when schools or teachers attempt to carry out practices or research in education, they are able to consult other similar research and practices carried out in the past or in other regions. The use of computers in this manner will promote cooperative research and will result in efficiency.

g. Problems arising from the use of computers

(a) Users are required to come to the centre. Remote schools and teachers do not have easy access to the computers.

(b) There is a need to develop processed information (such as the analysis of educational research and practice and theme and tendency of educational research) based on stored educational research papers and records of referential use, and to supply them regularly to the schools or teachers.

(2) Data processing service for schools and teachers

1) Data processing service contents

At this centre, the contents of the processing service are compiled in a booklet and distributed to each school. The schools or teachers learn of the contents of the service and how to prepare data. They make reservations for the needed processes by telephone, and the service needed is rendered upon arrival at the centre at the appointed time and day.

a. Data processing service regarding study guidance

(a) Test score processing

Data processing of test scores needed for office work concerning instructional activities, guidance counseling and future options at schools is carried out, and documents of various categories are prepared.

(b) "S-P Table" processing (Student Problem Score Table)

Data concerning students' success and failure in solving test problems and oral questions posed by teachers are inputted and a table is prepared. It is designed for easy examination over such issues as learning problems of students, suitability of instructional methods and existing discrepancies between the teaching of teachers (methods, apportionments of time, etc.) and the learning of students (understandings, stumbles, etc.).

(c) Data processing for the preparation of academic diagnoses.

Data concerning the instructional activities (including instructional objectives and others) are inputted along with the data of the above-mentioned "S-P Table." Based on the data, grade- or class-wise information is gained on students achievement in the light of instructional objectives and their tendencies in incorrect answers. Also, information is prepared on individual students in terms of achievement.

b. Data processing services concerning instruction in health and physical education

(a) Processing data on physical examinations and measurement of the physique.

(b) Processing data from athletic ability tests.

c. Data analysis and processing services for investigation in educational research

(a) Data processing of questionnaires.

(b) Data processing for various statistics.

(c) Multivariate analysis such as "factor analysis."

2) Use

The situation of the schools and teachers taking advantage of the data processing services is described in Table 2.

Table 2 The Schools and Teachers Taking Advantage of the Data Processing Services at Aichi Prefectural Education Center (1982)

Data Processing Contents	Elem. Schools	Lower Sec. Schools	Upper Sec. Schools	Others	Total (%)
"S-P Table"	76	59	84	84	293 (6.4)
Learning diagnosis	76	48	66	24	214 (4.6)
Test scores	4	638	604	0	1,246 (27.0)
Data on physical exam., measurement of physiques & athletic ability test	12	12	165	121	310 (6.7)
Questionnaires	123	164	409	253	949 (20.6)
Investigation data for educational research	177	198	225	1,003	1,603 (34.7)
Total (%)	468 (10.1)	1,119 (24.3)	1,543 (33.4)	1,485 (32.2)	4,615 (100)
Total number of public schools in Aichi Pref. (as of 1 May 1982)	952	370	164	-	-
Number of cases processed per school	0.49	3.02	9.41	-	-
Number of students listed as data (%)	171,906 (7.7)	355,449 (16.0)	790,452 (35.5)	906,459 (40.8)	2,224,266 (100)
Total number of public school students in Aichi Pref. (as of 1 May 1982)	678,322	307,012	165,897	-	-
Number of cases processed per student	0.25	1.16	4.76	-	-

Data analysis and processing for the investigation of educational research is most popular and is increasing. It accounts for 34.7% of all cases of computer use. Its characteristics consist of research consultation services on the preparation of questions and hypotheses for investigation, the methods of research work, and the interpretation of data processing results.

Transaction of the "S-P Table" and learning diagnoses are put into use for research on classroom work rather than for daily educational practices. This is thought to result from the fact that there is a gap between the obtaining of data processing results and the flow of educational practices. This gap occurs because the schools have no terminals, and the users must come to the centre to get the data processing results. Therefore, data processing which is closely related to educational practices such as these is effected by the introduction of microcomputers (which will be mentioned later in this report) into schools.

Schools taking advantage of the test score processing service usually make continual use of this service from year to year as a system for transaction of business related to guidance counseling, future options and instruction within the schools.

It is often a problem for schools and teachers located far from this centre. They have difficulty in getting to the centre. The number of cases processed is 0.5, 3.0 and 9.4 per year per school for the elementary, lower secondary and upper secondary schools respectively.

Also there were cases in which data processing services were provided for a broader region containing schools of different levels. These services were not listed on the table.

(3) Data processing services for educational administrative institutions

1) Transaction of office work concerning selection of entrance for public upper secondary schools.

2) Transaction of office work concerning selective examinations for service of public school teachers.

3) Data analysis and processing on physiques and physical strength of public school students.

(4) In-service computer training for teachers and other education-related personnel

The contents of in-service computer training courses at this centre which allow the teachers and other education-related personnel to acquire techniques regarding data processing are indicated in Table 3.

There are only 20 terminals available for the in-service training at the centre. The number of participants is, therefore, limited. Two separate cooperative data processing training centres for vocational upper secondary school students are established within Aichi Prefecture. Systems and contents of each of the courses are described below.

1) Courses consisting mainly of FORTRAN, a language suited for scientific and technical computation.

a. Courses for application of processed data

These courses aim at the improvements of daily class instruction. The participants collect, process and analyze data gained through educational practices with the help of the processing services at this centre. They are composed of the following two-step courses:

(a) Basic course

The course is designed for beginners. Instructions are given at fundamental levels concerning computer functions and language (FORTRAN). Application of processed results to educational practices is emphasized during the training. (6 days, 20 participants)

(b) Advanced course

The course is designed for those who have already completed the basic course. Each attending participant chooses a subject theme common to daily educational practices. Courses are held throughout the year. The course is provided as follows: data collection, computer processing and analysis, interpretation of the results, and improvement of measures for instruction, application to

Table 3 Contents of the In-Service Training for Teachers and Other Education-related Personnel Held at Aichi Prefectural Education Center

Level of courses	Courses	Number of courses	Days	Course contents	Number of participants
Basic Computer Course	Application of processed data	1	6	1. Introduction to computers 2. Intro. to programming (FORTRAN) 3. Data processing drills & application of results	Elementary and secondary school teachers 20
	Programming	1	6	1. Introduction to computers 2. Fundamental programming (FORTRAN) 3. Data processing	Upper secondary school teachers 20
Advanced Computer Course	Application of processed data	1	8	1. Educational technology 2. Methods of educational research 3. Data processing drills & application of results	Elementary, lower and upper secondary school teachers 15
	Programming	1	8	1. Programming (FORTRAN) 2. Data processing	Elementary, lower and upper secondary school teachers 15
Beginners' Basic Course	Elementary and lower secondary school	1	3	1. Introduction to computers 2. Fundamental programming (BASIC) 3. Data processing	Elementary, lower and upper secondary school teachers 20
	Upper secondary school	2	3		Upper secondary school teachers 40

educational practices and the examination of effects. (10 days, 15 participants)

b. Programming classes

These classes aim at the preparation and development of the data processing programmes in FORTRAN. They are composed of the following two-step courses:

(a) Basic course

The course is designed for beginners. The participants receive in-service training on the functions and formation of computer machinery and on the fundamentals of FORTRAN language. (6 days, 20 participants)

(b) Advanced course

The course is designed for those who have already completed the basic course. The participants decide upon the data processing contents needed at their schools beforehand and create programmes for these processings during the course.

2) Classes on BASIC, a language suited for microcomputers.

The courses are designed for beginners, and aim at acclimating the participants to microcomputer operations and offering them a background in developing data processing programmes needed at their schools. This is accomplished through instruction on basic operations of the machinery as well as on the fundamentals of the BASIC language. (3 days, 20 participants, 3 courses)

II. SCHOOL USES OF MICROCOMPUTERS

In recent years, there has been an increasing tendency among schools to introduce computers, especially microcomputers. This is due to their high performance and low price. Many teachers purchase and use microcomputers individually as well. The school uses are presented here.

1. School Uses of Microcomputers in Japan

Recently the introduction of microcomputers into education has been arousing more and more interest. As a result, the Ministry of Education, Science and Culture conducted a fact finding investigation on the

diffusion and uses of microcomputers among schools throughout the nation. These results were made public on 1 January 1983. Described below are the findings regarding schools.

(1) Establishment of Microcomputers

Microcomputers are established in elementary, lower secondary and upper secondary schools in the following manner (Table 4):

Table 4 Establishment of Microcomputers among Schools (as of 1 January 1983)

Classification		A	B	C	D
Elementary schools	Public	27	21,802	0.1	1.1
	Private	9	168	5.4	2.4
	Total	36	24,970	0.1	1.4
Lower secondary schools	Public	94	10,252	0.9	1.3
	Private	100	550	18.2	3.1
	Total	194	10,802	1.8	2.2
Upper secondary schools	Public	1,970	3,954	49.8	3.9
	Private	400	1,242	32.2	4.8
	Total	2,370	5,196	45.6	4.1

Notes: A - Number of schools having microcomputers

B - Total number of schools (as of 1 May 1982)

C - Establishment rate, i.e., $\frac{A}{B}$

D - Average number of units established by school with computer

Approximately half of the public upper secondary schools and approximately 30% of the private upper secondary schools are furnished with microcomputers. Only a few elementary and lower secondary schools (0.1% and 1.8% of them respectively) own such equipment.

(2) Uses in Schools

Uses of microcomputers in schools are shown in Table 5.

Table 5 Uses of Microcomputers in Schools in Japan
(as of 1 January 1983)

Classification		A	B	C	D	E
Elementary schools	Public	23 (85.2)	6 (22.2)	0 (0.0)	15 (55.6)	27
	Private	2 (22.2)	8 (88.9)	0 (0.0)	2 (22.2)	9
	Total	25 (69.4)	14 (38.9)	0 (0.0)	17 (47.2)	36
Lower secondary schools	Public	31 (33.0)	60 (63.8)	2 (2.1)	32 (34.0)	94
	Private	18 (18.0)	76 (76.0)	2 (2.0)	31 (31.0)	100
	Total	49 (25.3)	136 (70.1)	4 (2.1)	63 (32.5)	194
Upper secondary schools	Public	688 (34.9)	1,209 (61.4)	318 (16.1)	766 (38.9)	1,970
	Private	131 (32.8)	294 (73.5)	59 (14.8)	111 (27.8)	400
	Total	819 (34.6)	1,503 (63.4)	377 (15.9)	877 (37.0)	2,370

Notes: A - CAI use

B - CMI use

C - Computer education

D - Club activities, etc.

E - Number of schools having microcomputers

A school with computer is allowed to make a multiple choice and numbers in parentheses are percentages to the numbers under E.

Generally speaking, CMI (Computer Managed Instruction) uses are most popular in secondary schools, while CAI (Computer Assisted Instruction) uses come first in elementary schools. Uses for club activities, etc. are second most popular at the three school levels.

Looking at the situation of the number of units established, CAI uses probably consist mostly of simple functions such as presentation of teaching materials during class. A typical CMI use would be data processing for student progress records and the transaction of office work. Uses for student training in vocational upper secondary schools are omitted in this investigation.

2. School Uses of Microcomputers in Aichi Prefecture

(1) School situations regarding microcomputers and requests for introduction

Situations of microcomputers and requests for them among elementary, lower secondary and upper secondary schools within Aichi Prefecture are presented in Table 6.

Table 6 Situations regarding Microcomputers and Requests for Introduction among Schools in Aichi Prefecture (as of 6 December 1982)

	Furnished with microcomputers			Not furnished with microcomputers			G	H	I
	A	B	C	D	E	F			
Elementary schools	6	0.7	1	72 (8.1%)	742 (83.6%)	68 (7.7%)	888 (100%)	951	93.4
Lower secondary schools	13	4.1	1.4	86 (27.1%)	189 (59.6%)	29 (9.2%)	317 (100%)	388	81.7
Upper secondary schools	120	63.2	6.3	29 (15.3%)	29 (15.3%)	12 (6.3%)	190 (100%)	211	90.1

Notes: A - Number of schools

B - Establishment rate (%)

C - Average number of units per school

D - Request for introduction within 3 years

E - No plans for introduction

F - No answers

G - Total number of schools that replied

H - Total number of national, public and private schools (as of May 1982)

I - Percentage replying, i.e., $\frac{G}{H}$

The investigation was carried out by this centre as of 6 December 1982. It deals with national, public and private schools for each level: elementary, lower secondary and upper secondary schools. The re-collecting rate is 90% throughout. Therefore, percentages such as establishment rate show the ratio to the number of schools which replied.

Establishment situations show tendencies similar to those on nation-wide scales. However, the rate is somewhat higher in Aichi on the whole. Approximately 60% for upper secondary schools is the highest among the three school levels, while 0.7% and 4.1% for elementary schools and lower secondary schools respectively are relatively low.

The percentages representing the requests for introduction within 3 years are approximately 27% for lower secondary schools, which is high. Approximately 15% and 8% for upper secondary and elementary schools respectively requested introduction within 3 years. This suggests that microcomputers are expected to be introduced into approximately 80% of upper secondary schools and spread out among approximately 30% of lower secondary schools and 9% of elementary schools for the coming years.

The average number of units per school among those which are furnished with microcomputers is approximately 6 units for upper secondary, 1.4 for lower secondary and 1 for elementary schools.

(2) Uses of microcomputers at schools

Uses of microcomputers in schools in Aichi Prefecture are shown in Table 7.

Table 7 Uses of Microcomputers in Schools in Aichi Prefecture (as of 6 December 1982)

Schools \ Uses	A	B	C	D	E
Elementary schools	3 (50.0)	5 (83.3)	2 (33.3)	3 (50.0)	6 (100)
Lower secondary schools	11 (84.6)	11 (84.6)	2 (15.4)	4 (30.8)	13 (100)
Upper secondary schools	80 (66.7)	108 (90.0)	63 (52.5)	44 (36.7)	120 (100)
Total	94 (67.6)	124 (89.2)	67 (48.2)	51 (36.7)	139 (100)

Notes: A - CAI uses

B - CMI uses

C - Administration and management

D - Educational research

E - Number of equipped schools

A school with computer is allowed to make a multiple choice and numbers in parentheses are percentages.

Uses of microcomputers in schools in Aichi Prefecture also show similar tendencies to those on a national level: CMI uses are most popular throughout - approximately 83%, 85% and 90% of the elementary, lower secondary and upper secondary schools, respectively, among schools that are equipped with microcomputers. Next come the CAI uses (including club activities uses) - approximately 50%, 85% and 68% of the elmentary, lower secondary and upper secondary schools, respectively, among schools furnished with microcomputers.

Investigative uses for educational research (i.e. data analysis for investigation and research, etc.) is approximately 37% on the whole, which is small compared to the uses mentioned above. This is due to the multitudinous amount of data and to the fact that the data processing contents tend to be highly advanced. There is a limit on the part of the hardware (microcomputer), such as processing speed, etc.

Lately, data processing (which is closely related with daily educational activities such as student progress record processing) shows a tendency to shift toward the use of microcomputers at schools. On the other hand, it is becoming indispensable to use computers at the centre for processing of highly advanced and multitudinous data such as the investigative data analysis for educational research. Moreover, time is required until processing results can be obtained, and a need for the assistance of specialists on the development of investigative questions, methods of data collection, research methods, and interpretation of analyzed results.

As to the uses for administration and management being approximately 48% overall, it can be assumed that most of the school uses of computers are for the learning activities of students, and uses for administration and management are only subordinate. Also, as mentioned later, many of the contents of the administrative and managing uses are related to guidance. Two such examples are the preparation of class schedules and lending services in libraries.

(3) Facts about school uses

The following are the main items of the actual uses picked up from the data processing programmes developed by upper secondary schools in Aichi Prefecture in their own unique ways.

1) CAI uses

a. Individualized mathematics study programme
b. Individualized science study programme
c. Presentation of the constellation
d. Three-dimensional molecular model
e. Numerical calculation
f. Calculation of food calories, etc.

2) CMI uses

a. Student records
b. Decisions for evaluation
c. "S-P Table"
d. Marking the objective tests by mark sheet method

e. Preparation of materials for interviews with parents

f. Preparation of materials for guidance counseling and future options

g. Preparation of materials for the lower secondary school-upper secondary school liaison meetings

h. Totalling measurement data of physiques, physical strength and athletic abilities, etc.

3) School administration and management uses

a. Preparation of class schedules

b. Reference and lending services of books

c. Office work related to the entrance selection

d. Preparation of tables of students showing their options in terms of the type of courses and subjects

e. Preparation of materials for credit-approvement

f. Attendance statistics

g. Preparation of the account books for student association and club activity budgets

h. Management of the equipment, etc.

4) Investigative uses for education research

a. Statistics of various kinds

b. Summing up of questionnaires

c. Cluster analysis

d. Factor analysis

e. Analysis of experimental data, etc.

(4) Development of Data Processing Programmes

The number of data processing programmes developed by schools in Aichi Prefecture by their own methods are shown in Table 8.

Table 8 Number of Data Processing Programmes Developed by Schools in Aichi Prefecture
(as of 6 December 1982)

No. of programmes / Schools	0	1-5	6-10	11-30	more than 30	A	B
Elementary schools	0	5 (83.3)	1 (16.7)	0	0	6 (100)	3.3
Lower secondary schools	0	10 (76.9)	3 (23.1)	0	0	13 (100)	5.4
Upper secondary schools	35 (29.2)	40 (33.3)	25 (20.8)	15 (12.5)	9 (7.5)	120 (100)	10.8
Total	35 (25.2)	55 (39.6)	29 (20.9)	15 (10.8)	9 (6.5)	139 (100)	10.0

Notes: A - Number of schools furnished with microcomputers

B - Average number of programmes developed per school having microcomputers

Numbers in parentheses are percentages.

The number of data processing programmes developed among schools which are equipped with microcomputers is: approximately 3 programmes for elementary schools, approximately 5 for lower secondary schools, and approximately 11 for upper secondary schools. Generally, schools having 1 to 5 programmes are most numerous; yet in the case of the upper secondary schools, 3 schools own more than 100 programmes while nearly 30% of the schools have no data processing programme of their own.

In the recent years, as has been described above, the training of teachers capable of developing data processing programmes needed at schools is becoming an important and indispensable issue. Accordingly, requests addressed to the centre for in-service training on computer languages and operating skills for microcomputers are increasing steadily.

The percentages of teachers trained for microcomputer operation are approximately 0.9, 1.4, 6.1 and 2.3% for elementary, lower secondary, upper secondary schools and schools as a whole, respectively, as of 6 December 1982. As compared with this, the percentage of teachers wishing to participate in this in-service training is approximately 3.2, 3.5 and 4.8% for elementary, lower secondary and upper secondary schools, respectively and approximately 3.7% overall.